

# Imaging of hip pain in children

« Die Kinderhüfte »  
24. November 2011

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# Imaging of hip pain in children

- What do imaging modalities show?
- Illustration of some common causes
- Systematic imaging approach

# Hip pain / Limping Refusal to weight bear



Common complaint

→ emergency consultation

- Genuine pathology

Cause needs to be established

- Urgent medical or surgical treatment

# Causes



- Trauma
  - Fracture
  - Sprain / strain / contusion
  - Overuse injury
- Orthopaedic / mechanical causes
  - Legg-Calvé-Perthes disease
  - Slipped capital femoral epiphysis
  - Osteochondroses
  - Developmental dysplasia of the hip
  - Leg length discrepancy
  - Impingement syndromes
- Infection
  - Osteomyelitis
  - Septic arthritis
- Inflammation
  - Transient synovitis, reactive arthritis
  - Juvenile idiopathic arthritis
- Neuromuscular disorders
- Haematologic disorders
- Neoplastic diseases
- Intra-abdominal disorders

# Investigation

- History
  - Age
  - Trauma
  - Sports
  - Recent illness
  - Pain (location, duration, timing, frequency)
  - Fever
  - Weight loss
- Clinical examination
  - Evaluation of gait
  - Joints – range of motion
  - Swelling, erythema, warmth, point of tenderness
- Blood tests
  - WBC count
  - ESR
  - CRP

➤ guide imaging approach



# Irritable hip

- Transient synovitis (Coxitis fugax)
  - 3 – 8 years
  - Unknown origin (viral, reactive?)
  - Self limiting (resolves within days)

## Ultrasound

- ESR              < 20 mm/h
- CRP              < 20 mg/l
- Temp              < 38 °C



# Irritable hip

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- DDx Septic arthritis  
Osteomyelitis

## Ultrasound

- ESR              > 20 mm/h
- CRP              > 20 mg/l
- Temp              > 38 °C

## Joint aspiration



# Ultrasound

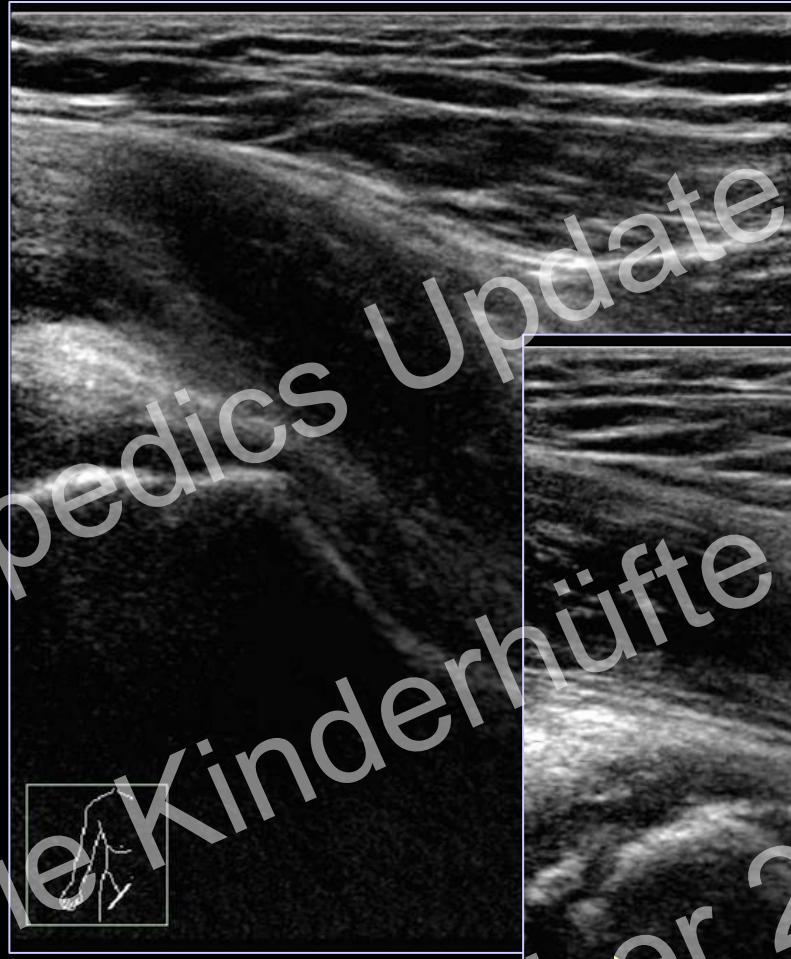
- Detects effusion
- No differentiation
  - Transudate
  - Pus
  - Haemorrhage
- Synovial thickening





# Ultrasound

- Detects effusion
- No differentiation
  - Transudate
  - Pus
  - Haemorrhage
- Synovial thickening
- Limited visualisation of bone



**Perthes disease**



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# Ultrasound

- Detects effusion
- No differentiation
  - Transudate
  - Pus
  - Haemorrhage
- Synovial thickening
- Limited visualisation of bone



**Slipped capital femoral epiphysis**

# Ultrasound + Radiographs

- Negative US
- Signs of infection
- > 8 years
- Persisting effusion
- Chronic hip pain

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# Radiographs

L

- Pelvis ap
- Frog leg lateral  
(axial Lauenstein)

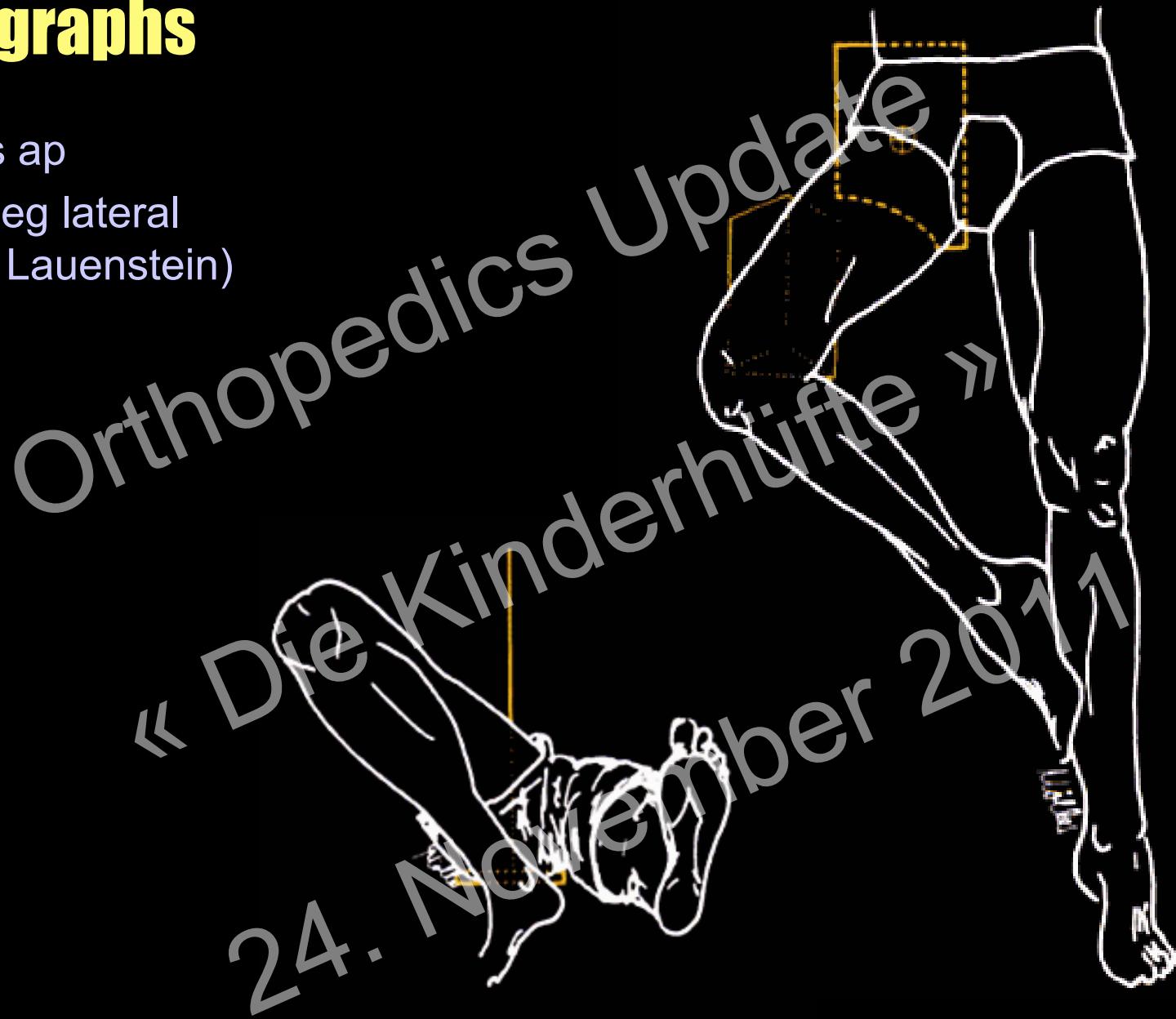
R

< 80°

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# Radiographs

- Pelvis ap
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**Perthes disease**

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# Radiographs

- Pelvis ap
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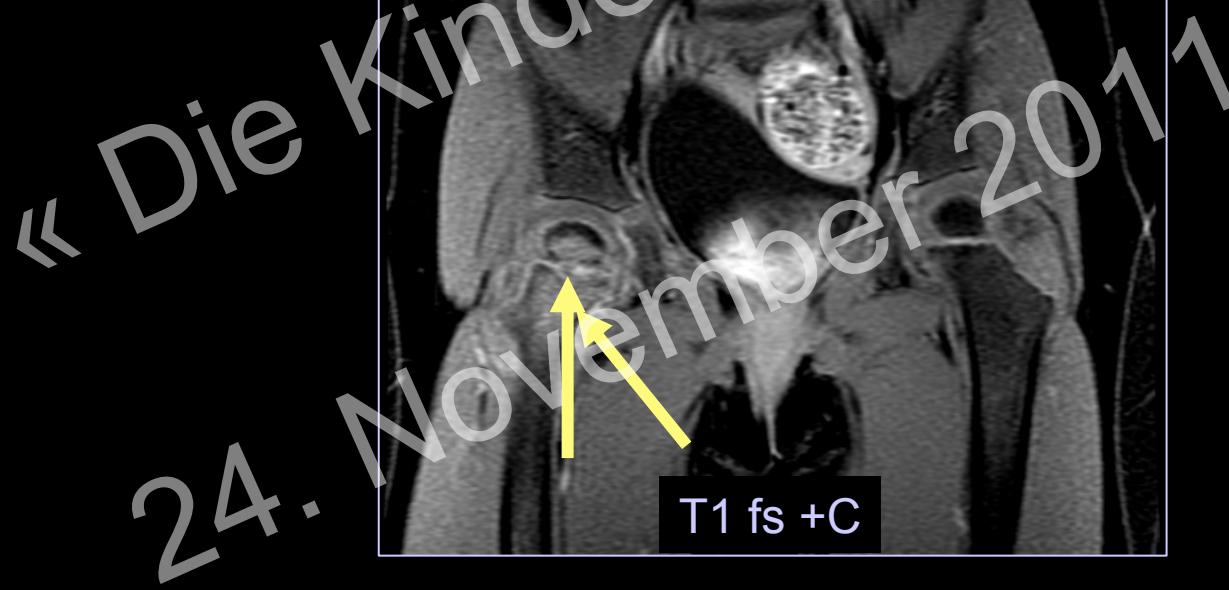
MRI



Teleangiectatic osteosarcoma

# MRI

- Tumour
- Osteomyelitis



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# MRI

- Tumour
- Osteomyelitis
- Perthes disease



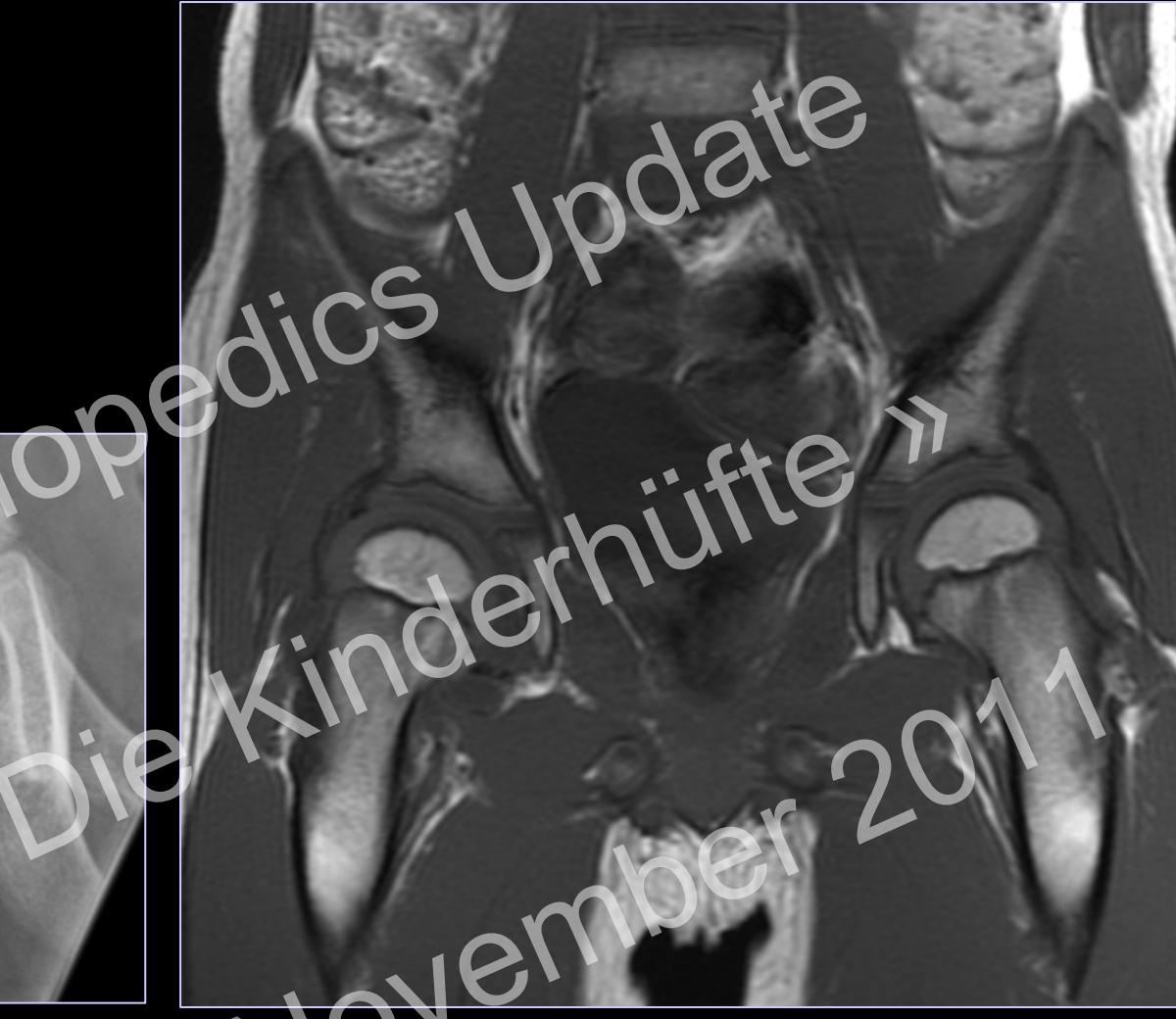
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STIR

# MRI

- Tumour
- Osteomyelitis
- Perthes disease



SE T1

# MRI

- Tumour
- Osteomyelitis
- Perthes disease



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Dynamic C+ gradient echo

# MRI

- Tumour
- Osteomyelitis
- Perthes disease
- SCFE

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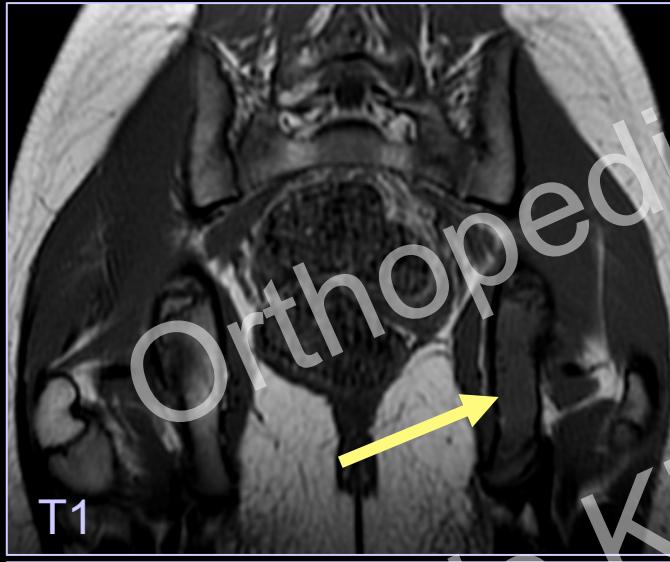
STIR

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# Focal oedema-like signal changes

(T1 ↓↓; STIR,T2 fs ↑↑; increased contrast enhancement)



T1



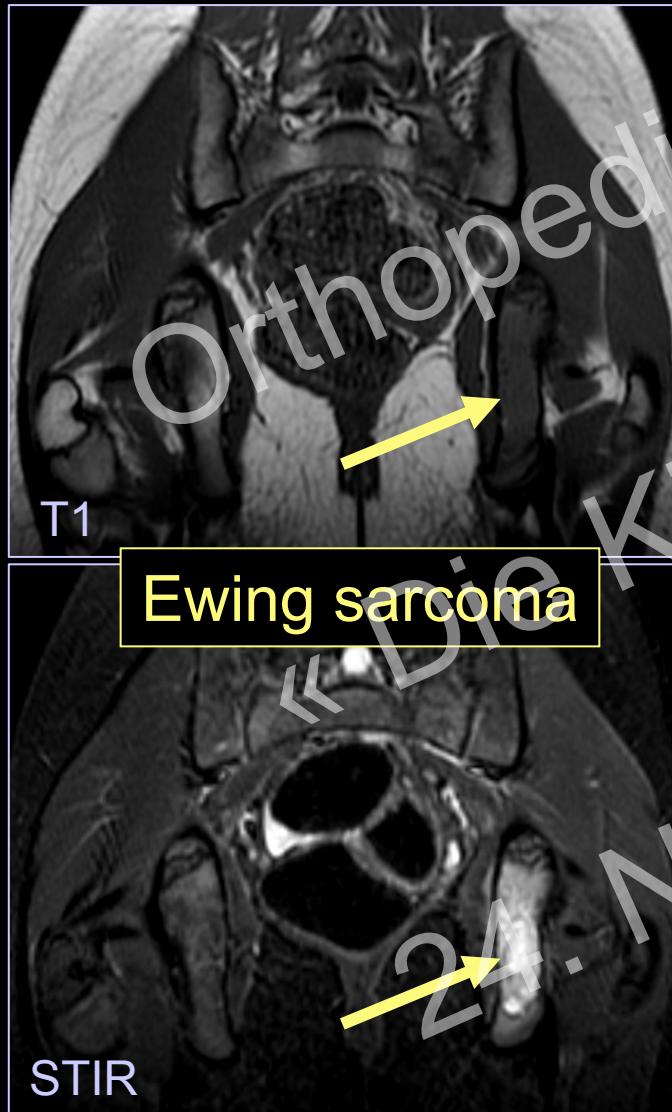
STIR

→ entirely non-specific!

- Oedema
- Hyperaemia
- Haemorrhage
- Necrosis
- Increased cellularity
  - Inflammatory cells
  - Malignant cells
  - Fibrosis

# Focal oedema-like signal changes

(T1 ↓↓; STIR,T2 fs ↑↑; increased contrast enhancement)



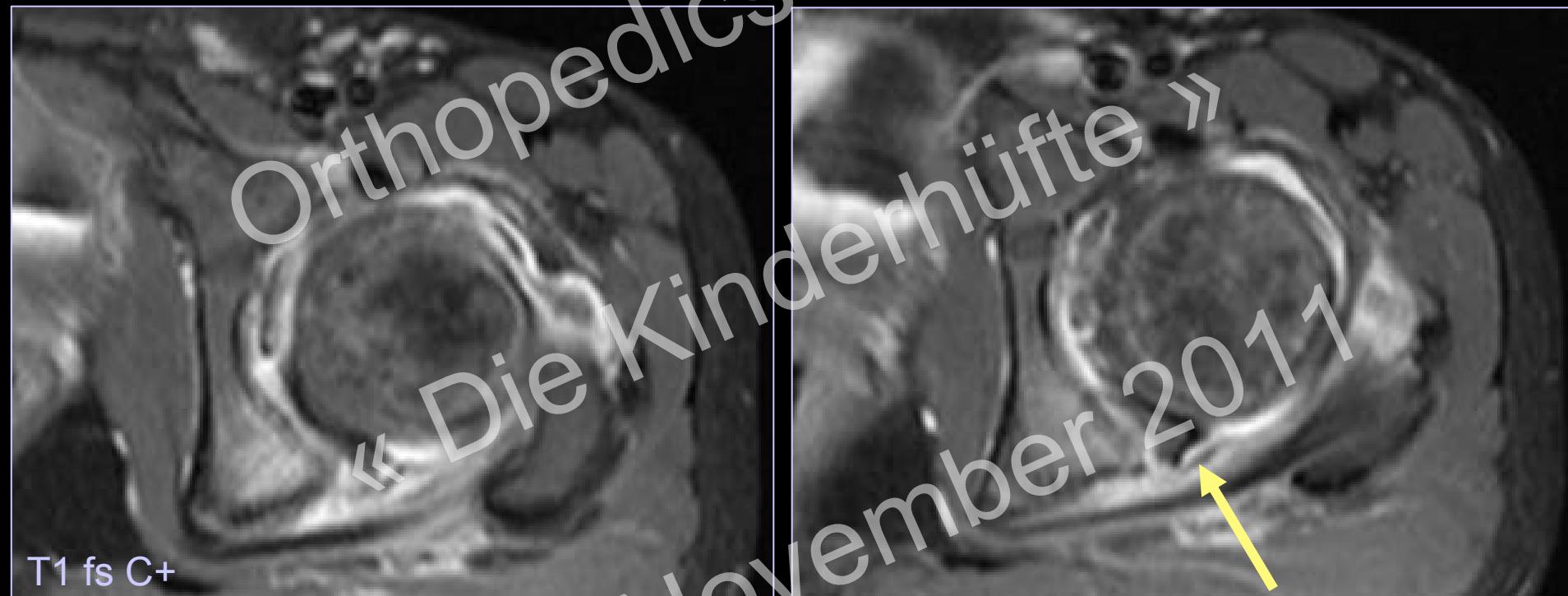
→ entirely non-specific!

- Trauma
- Inflammation / Infection
- Tumour
- Clinical correlation
  - History of trauma / sports?
  - Signs of infection?
- Biopsy
  - Aggressive lesions

# Focal oedema-like signal changes

(T1 ↓↓; STIR,T2 fs ↑↑; increased contrast enhancement)

→ additional findings?



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Fracture

# Focal oedema-like signal changes

(T1 ↓↓; STIR,T2 fs ↑↑; increased contrast enhancement)

→ additional findings?



STIR

Osteoidosteoma

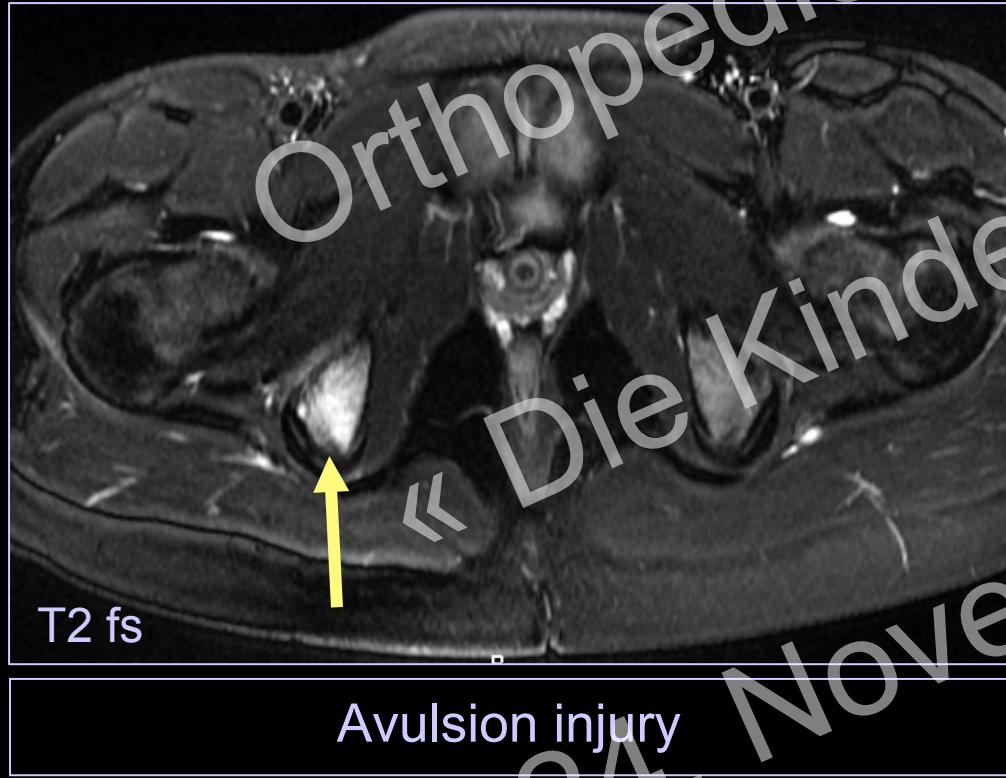
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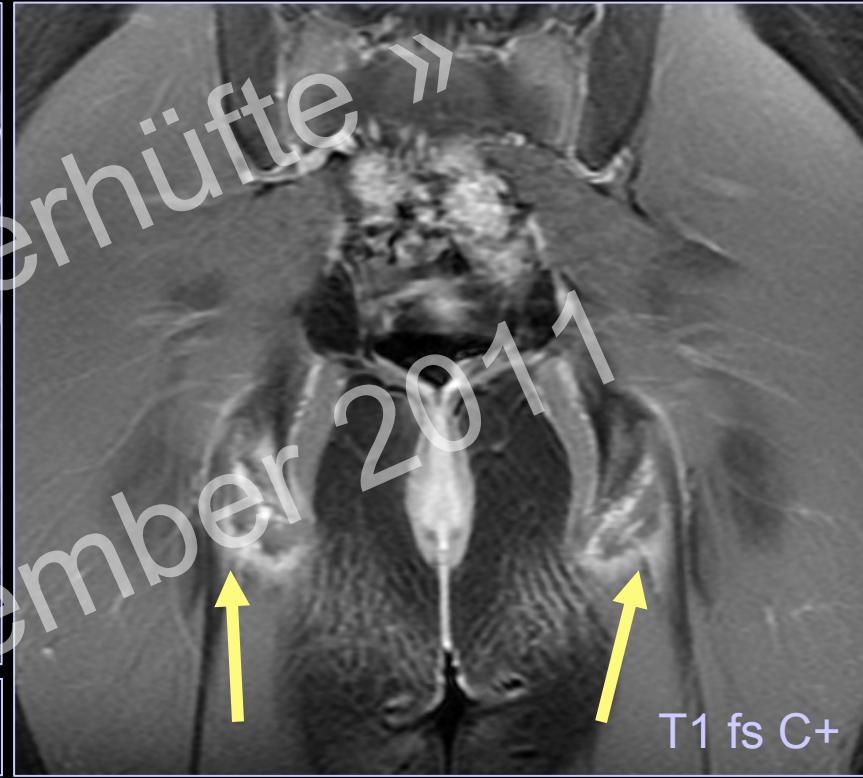
# Focal oedema-like signal changes

(T1 ↓↓; STIR,T2 fs ↑↑; increased contrast enhancement)

→ additional findings?



Avulsion injury



T1 fs C+

# Chronic avulsion injury

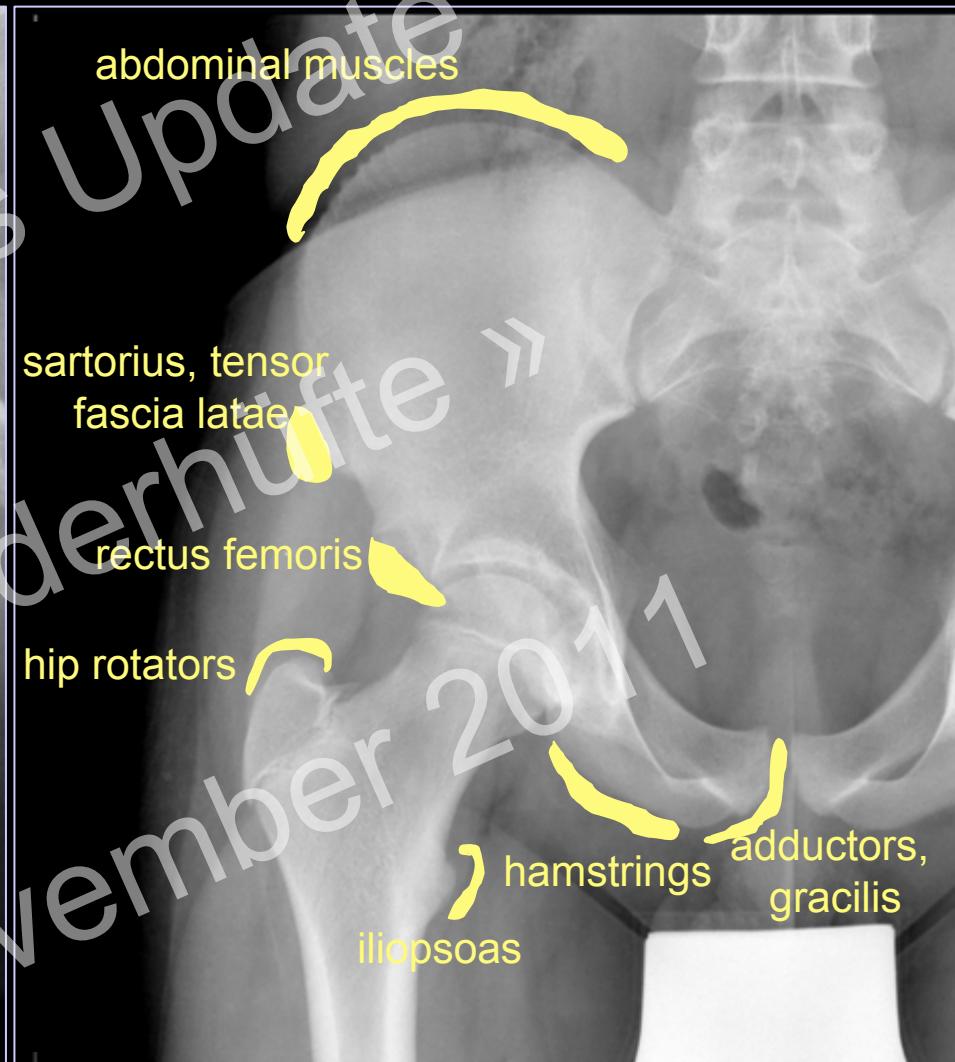
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Ex: 10153  
Se: 7/7  
Im: 9/16

TR: 480  
TE: 17  
4.0thk/1.0sp  
W: 500/L: 143

T1 fs C+

# Chronic avulsion injury





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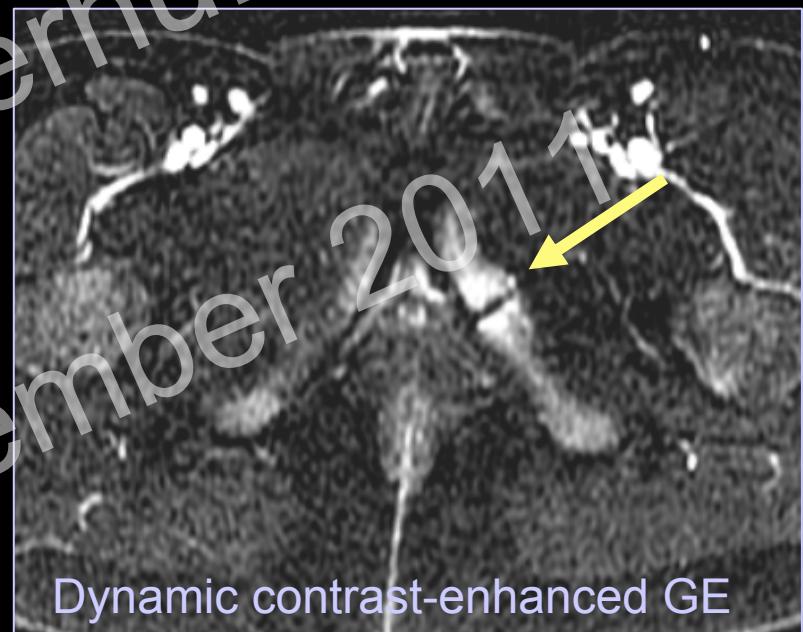
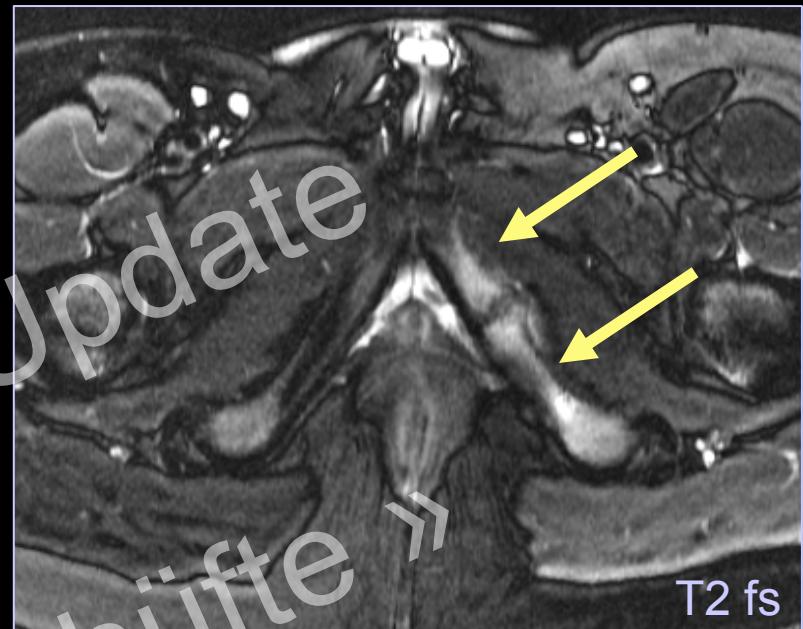
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9-y-old boy, chronic pain left groin



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9-y-old boy, chronic pain left groin

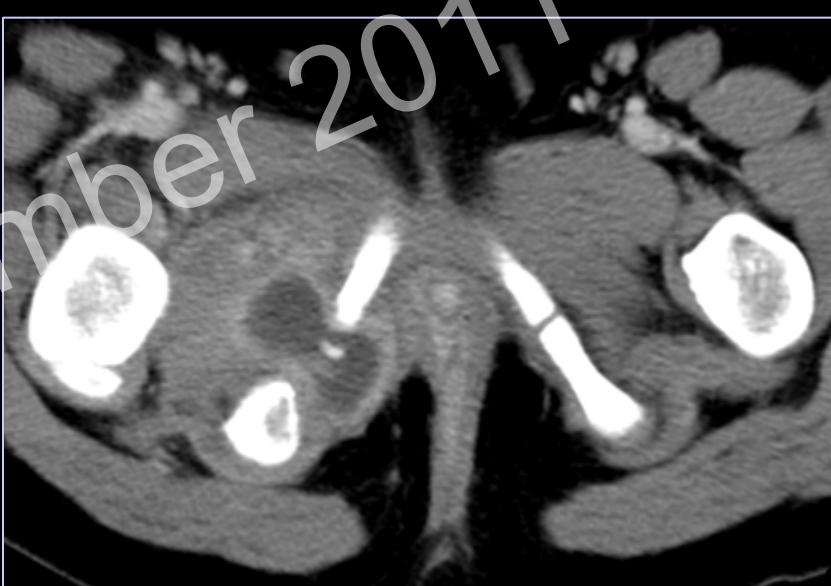
# Ischiopubic synchondrosis

- Asymmetric closure 4 – 12 y
  - Masslike swelling with irregular mineralisation
  - Oedema-like signal changes
  - Contrast enhancement
  - Can be associated with pain

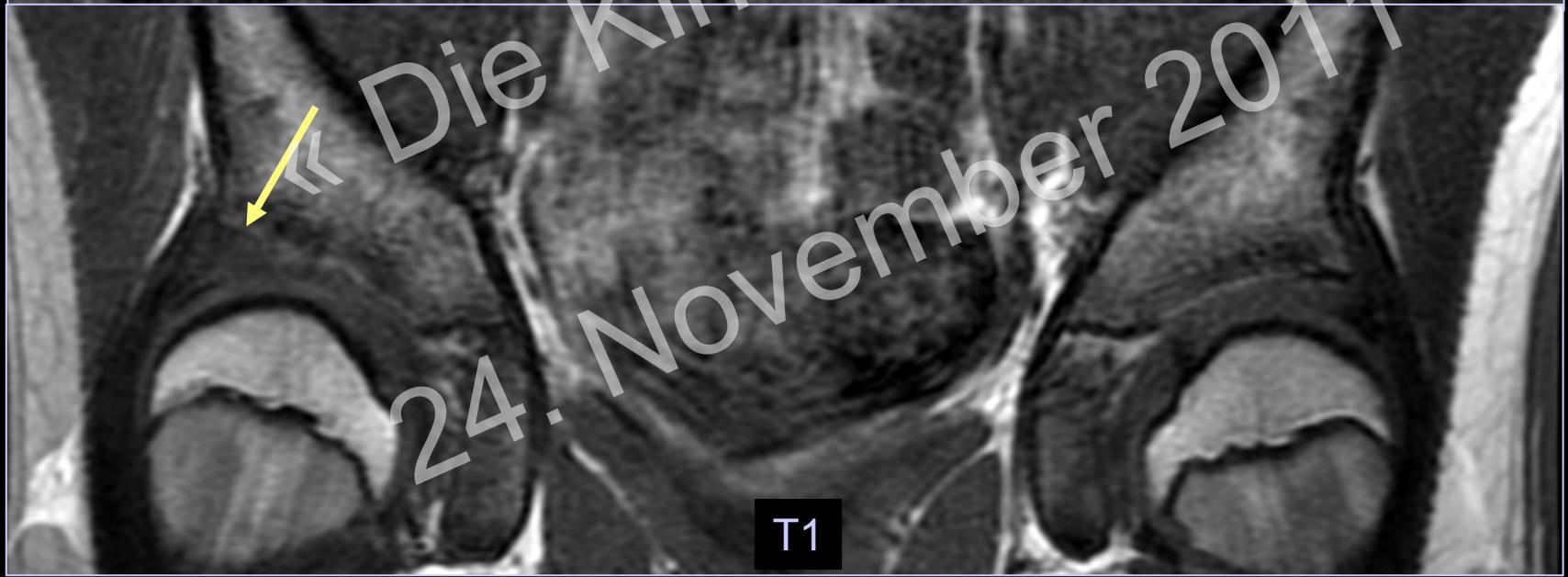


# Ischiopubic synchondrosis

- Asymmetric closure 4 – 12 y
  - Masslike swelling with irregular mineralisation
  - Oedema-like signal changes
  - Contrast enhancement
  - Can be associated with pain
- Site of osteomyelitis
  - Extensive soft tissue changes
  - Abscess
  - Clinical signs of infection



# Cartilage



# Imaging of hip pain in children

- Ultrasound
    - first line imaging modality
    - effusion
  - Radiography
    - 2 planes
    - bony lesions (trauma, tumour, hip diseases in older children)
  - MRI
    - bone marrow, soft tissues
    - dynamic contrast enhanced imaging: perfusion of femoral head
    - MR arthrography: articular cartilage + impingement syndromes
    - evaluation of chronic hip pain
    - per se often non-specific
- Correlation with history + clinical findings
- Joint aspiration / biopsy